

# IDAHO NATIONAL LABS: TENSILE TESTING SYSTEM

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## Objective

Design a tensile testing system that will fit through an 8-inch access port inside a glovebox and can perform tensile tests at temperatures reaching 700°C.

## Background

- A glove box is required to protect people from the potentially harmful conditions that could arise from the testing of certain alloy such as INL's current project using Ur-PI-Zr alloys.
- Current existing small-scale tensile testing systems are:
  - Extremely expensive
  - Do not have heating systems attached.



## Value Proposition

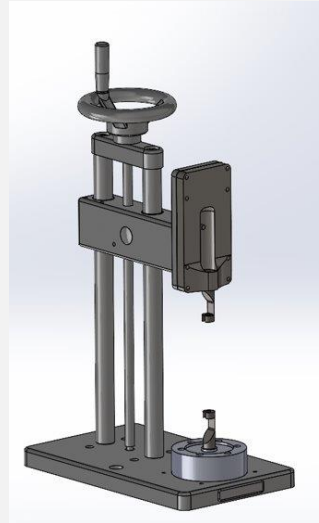
The goal is to create an easy to assemble and use small-scale tensile testing system for an existing glovebox. Our tensile testing system aims to be able to fit through an 8-inch hole in five or less easily assembled subassemblies.

## Key Requirements

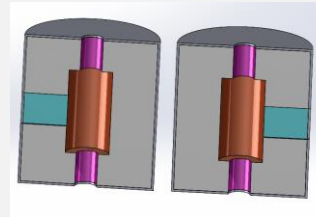
- Must be able to complete a tensile test and gather data
- Must be able to run a test at 700 degrees C
- Must fit through an 8-inch glove hole
- Must be easy to assemble with gloves on

## Concept Development

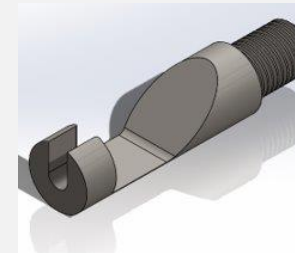
Old Frame Design



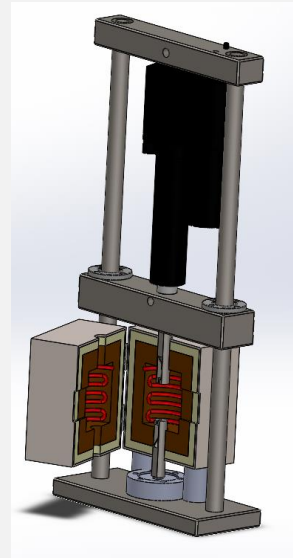
Old Heater Design



Old Grip Design

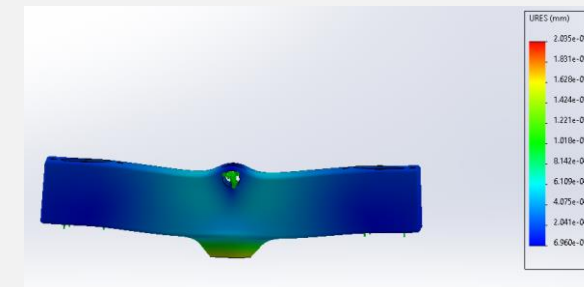
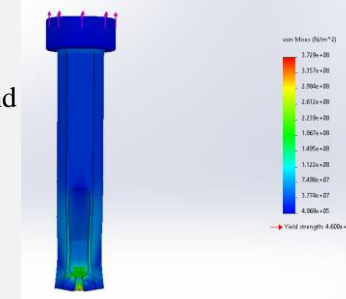


## New System Design



## Validation

FEA done Via SolidWorks on the current grip and cross head



## Summary

- Our new design will be able to exert up to 2000 lbf, which should be enough to test ASTM specimens up to 1.5" long.
- Now that we are finishing up our new design, we can begin ordering parts and materials.
- Still need to finalize design of electronic components: actuator and temperature control, temperature sensor feedback system, and extensometer.

## Acknowledgements

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Lead Instructor: Michael Maughan

Shop Expert: Bill Magnie